US006459871B2

(12) **United States Patent**
Kwak et al.

(10) **Patent No.: US 6,459,871 B2**
(45) **Date of Patent: Oct. 1, 2002**

(54) **PHOTOSENSITIVE BELT CARTRIDGE OF ELECTROPHOTOGRAPHIC IMAGE FORMING APPARATUS AND PHOTOSENSITIVE BELT INSTALLATION DEVICE AND METHOD EMPLOYING SAME**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/794,165**

(22) Filed: **Feb. 28, 2001**

(30) **Foreign Application Priority Data**

Jul. 8, 2000 (KR) 00-39092

(51) **Int. Cl.**[7] **G03G 15/00**
(52) **U.S. Cl.** **399/116**; 399/162; 206/303
(58) **Field of Search** 399/116, 162; 206/303, 53, 389

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(57) **ABSTRACT**

A photosensitive belt installation device of an electrophotographic image forming apparatus that includes a soft cartridge which rolls up for storage, and an installation guide member which selectively attaches to the image forming apparatus. When unrolled, the cartridge, allows the simple installation of a photosensitive belt into the imaging forming apparatus. The soft cartridge is a flexible cartridge having a shape of the endless track of a belt unit of the imaging forming apparatus, and is open on both sides. The unrolled soft cartridge supports the photosensitive belt during installation, as one open side of the soft cartridge is fitted over a sloping surface of the installation guide member attached to the front frame of the belt unit. The soft cartridge is completely pushed around the belt unit along a sloping surface of the installation guide member. The photosensitive belt remains around the belt unit as the soft cartridge is pulled out. The installation guide member is then be removed from the front of the belt unit.

17 Claims, 8 Drawing Sheets

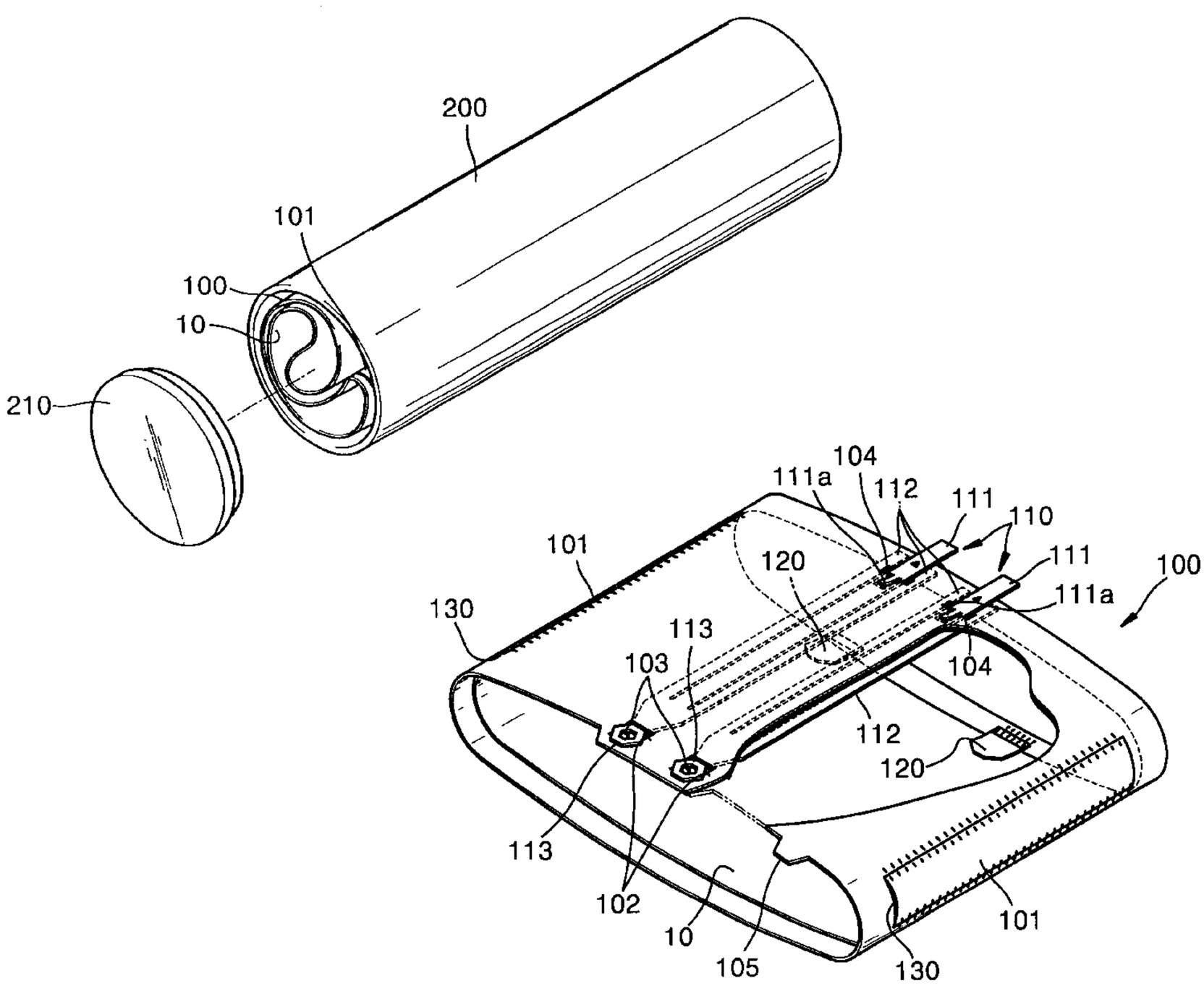


FIG. 1 (PRIOR ART)

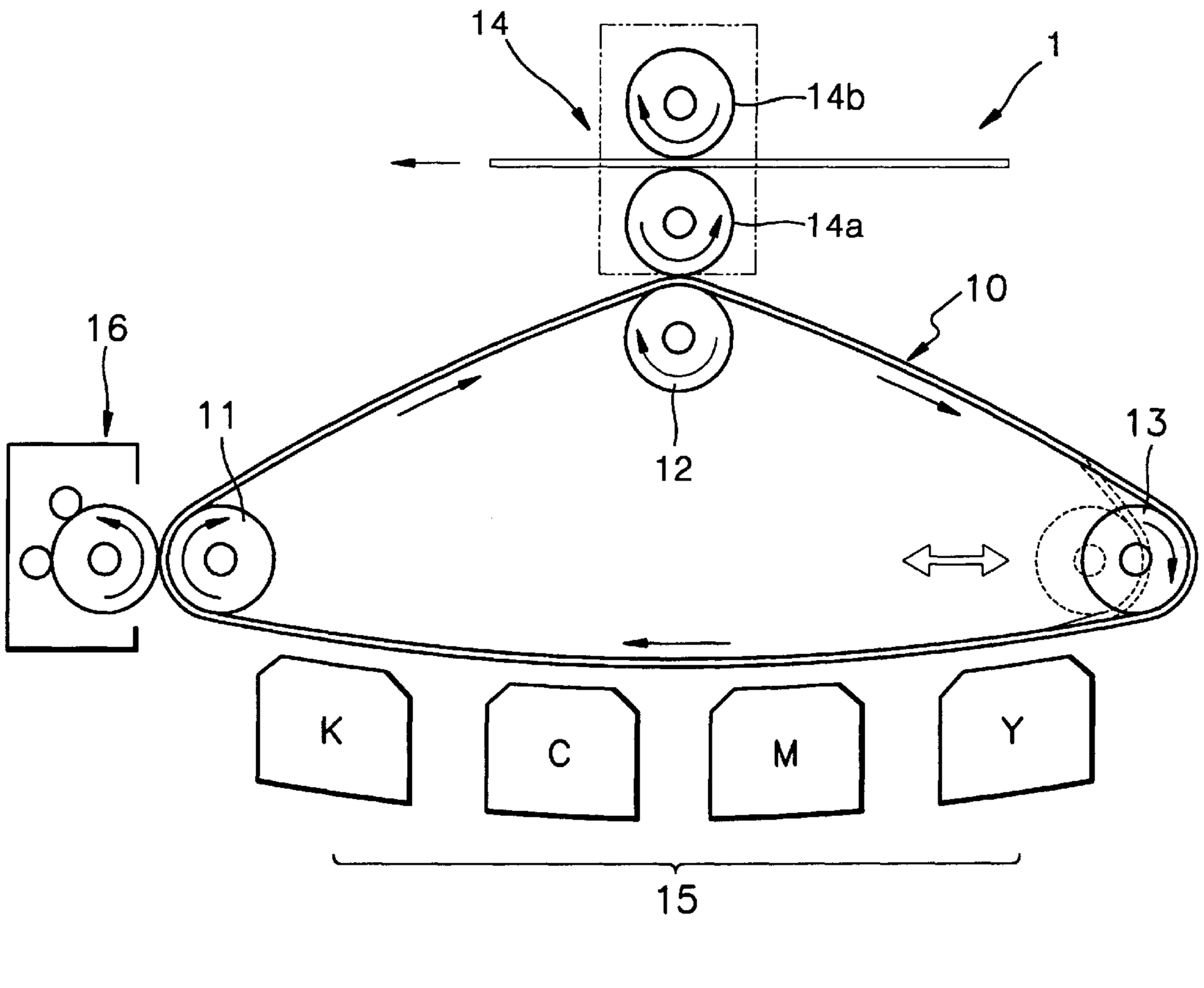
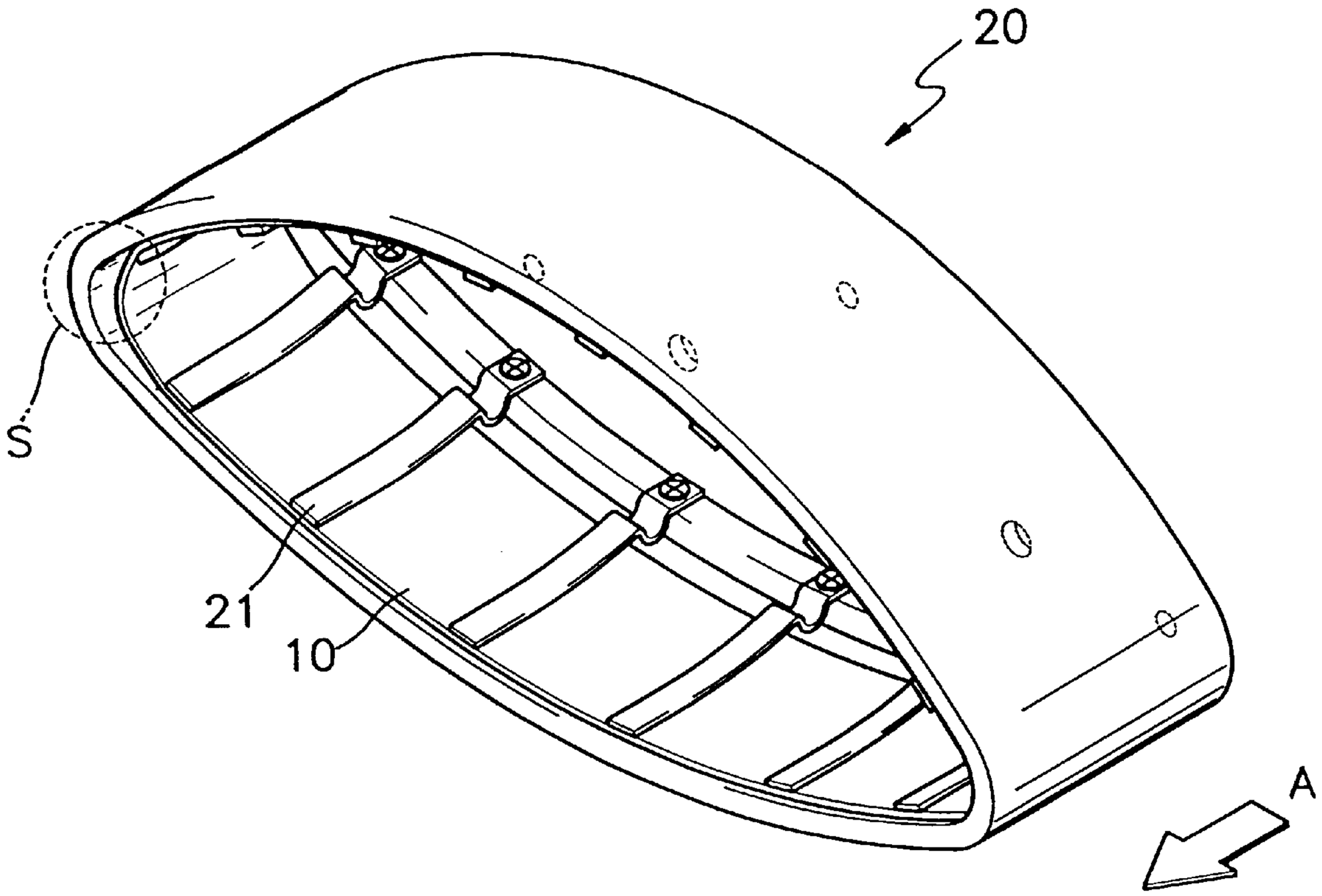


FIG. 2
(PRIOR ART)



(PRIOR ART)

FIG. 3

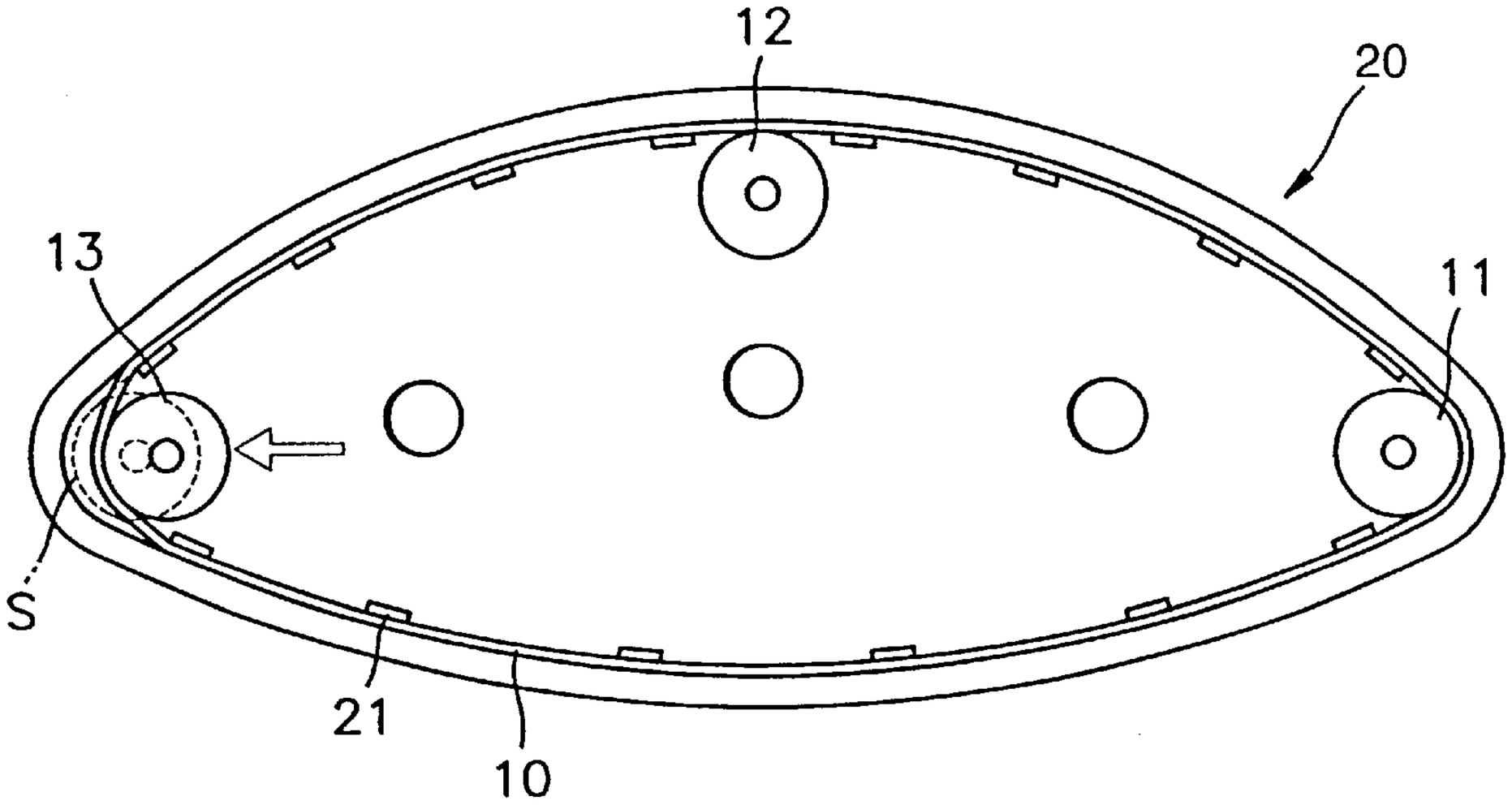


FIG. 4

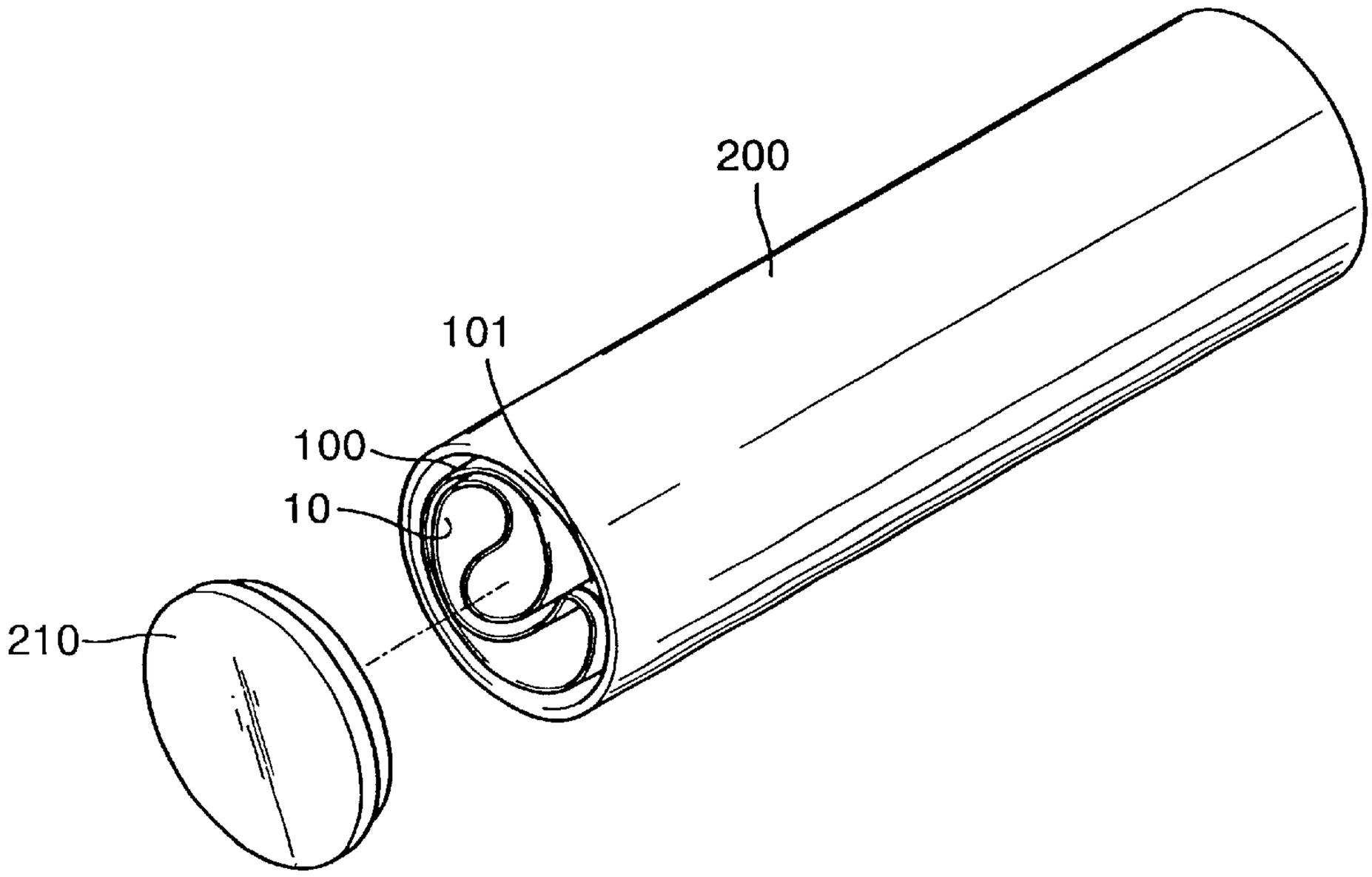


FIG. 5

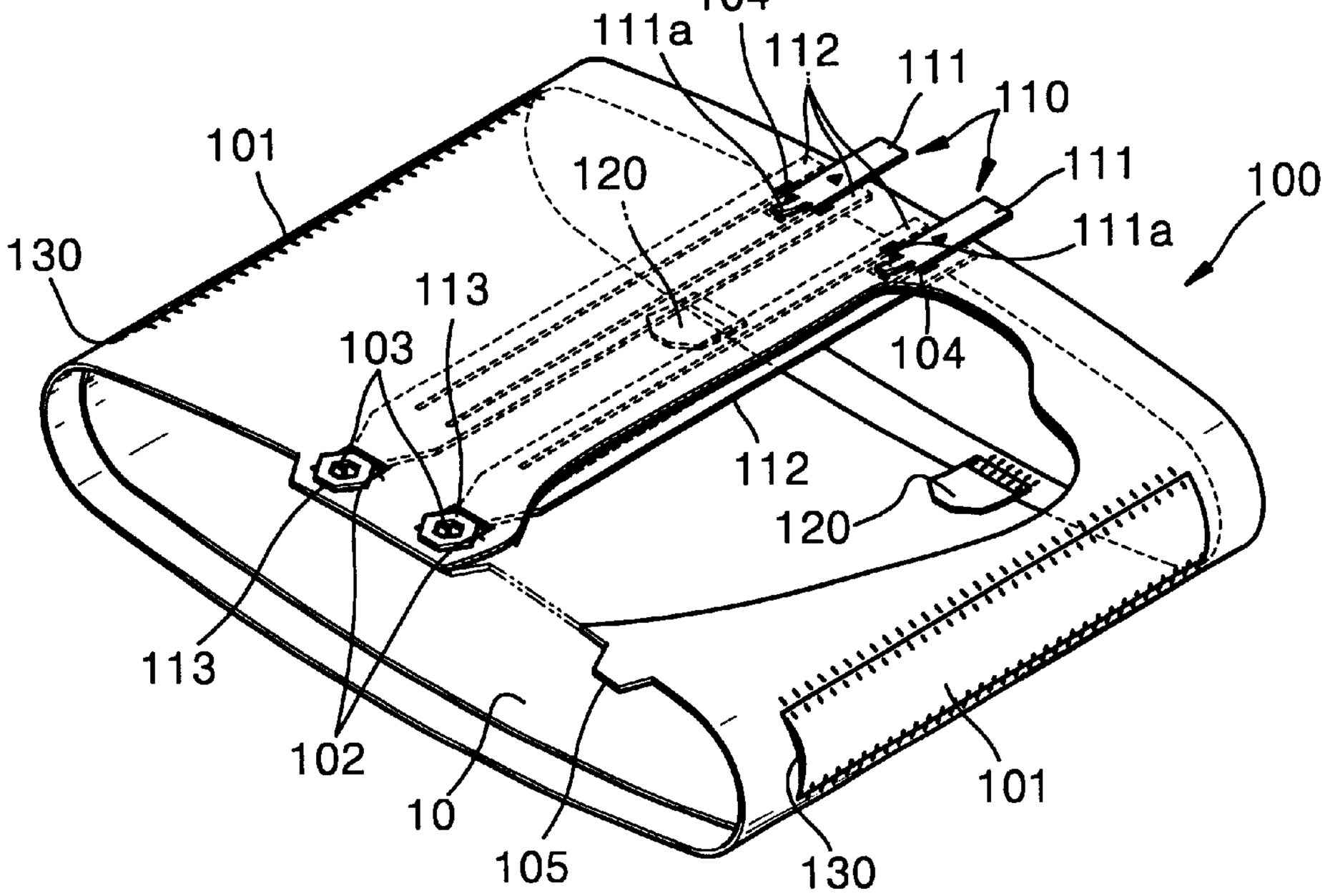

104
111a
112
111
110
101
120
111
100
111a
130
113
103
104
112
120
113
102
101
10
105
130

FIG. 6

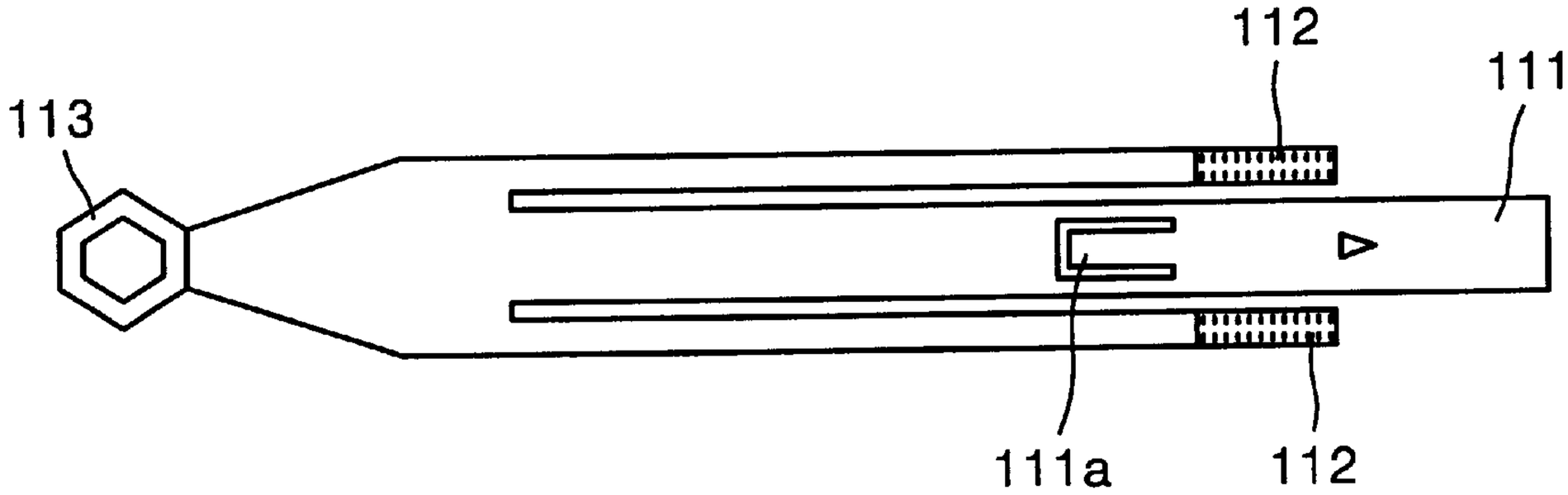

112
111
113
111a
112

FIG. 7

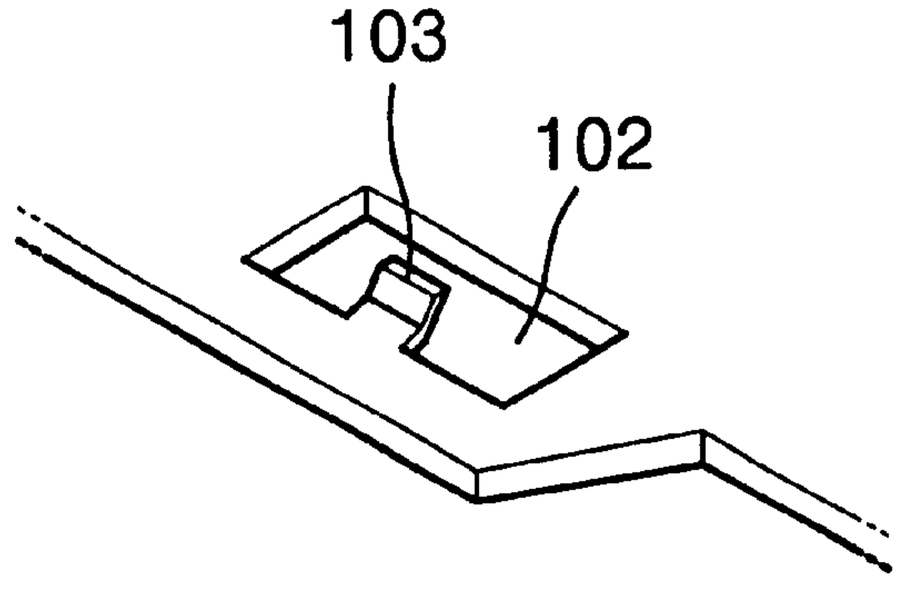


FIG. 8

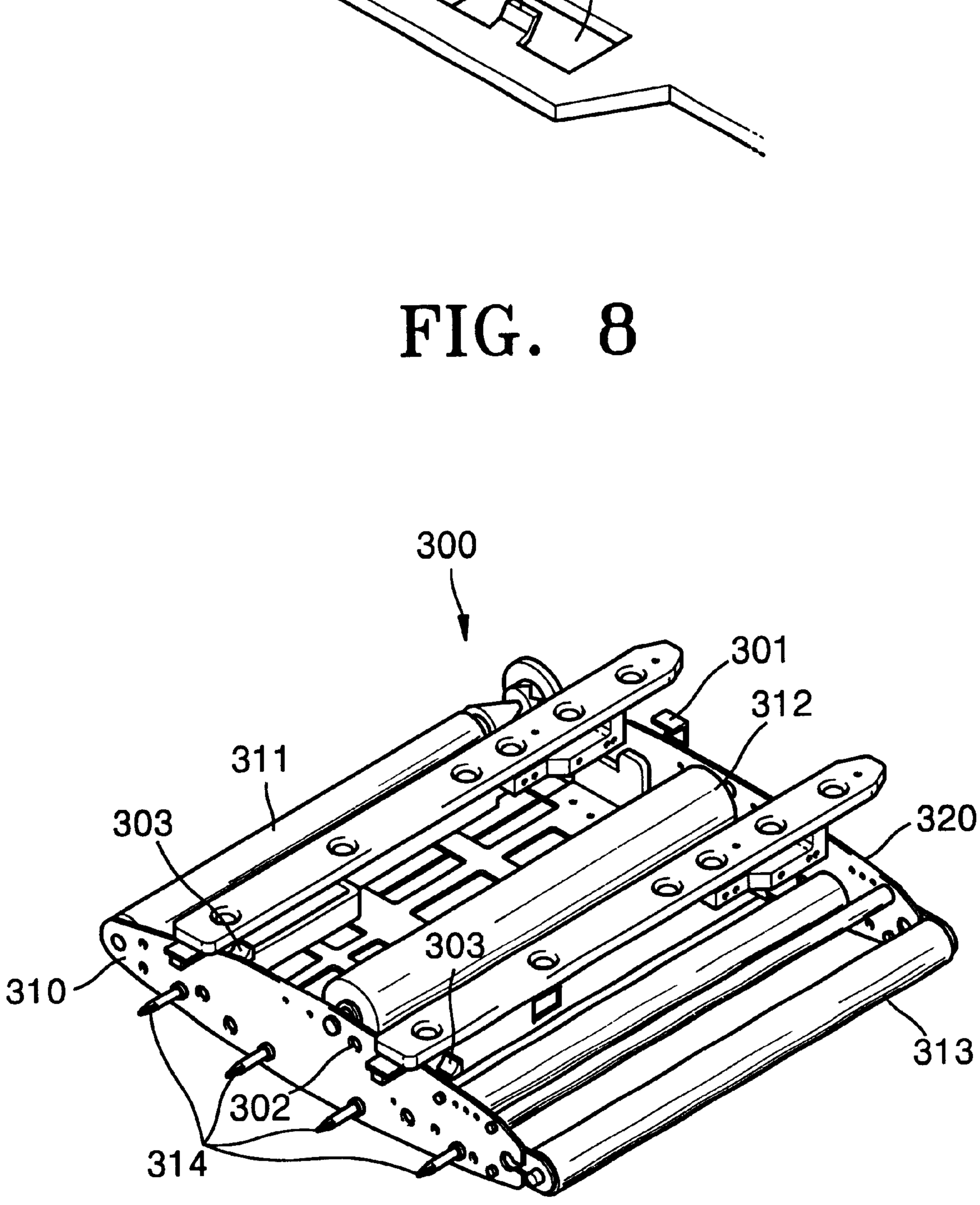


FIG. 9

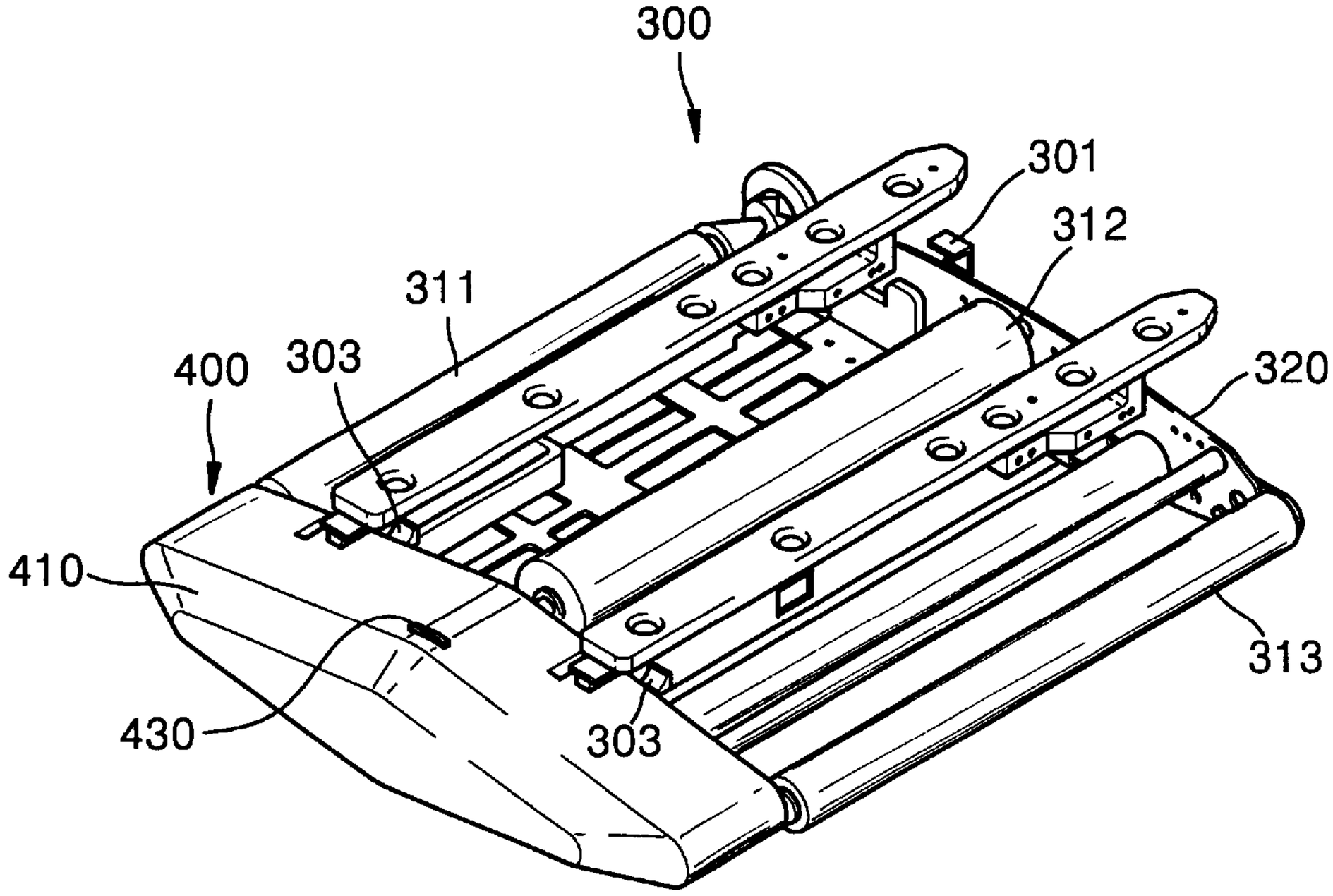

300
301
312
311
303
400
320
410
313
430
303

FIG. 10

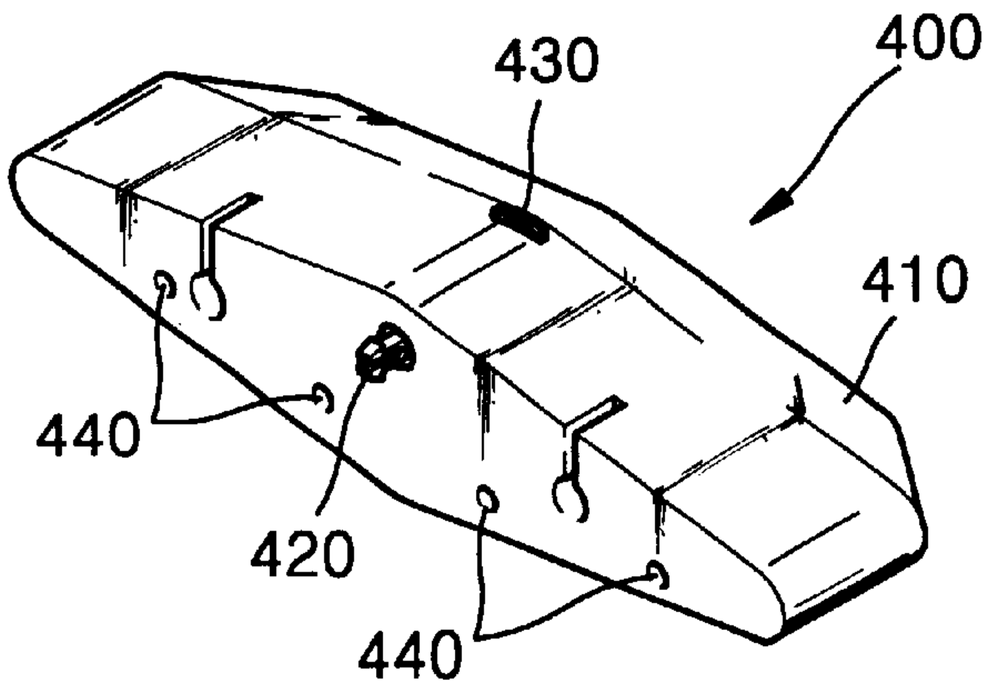

430
400
410
440
420
440

FIG. 11

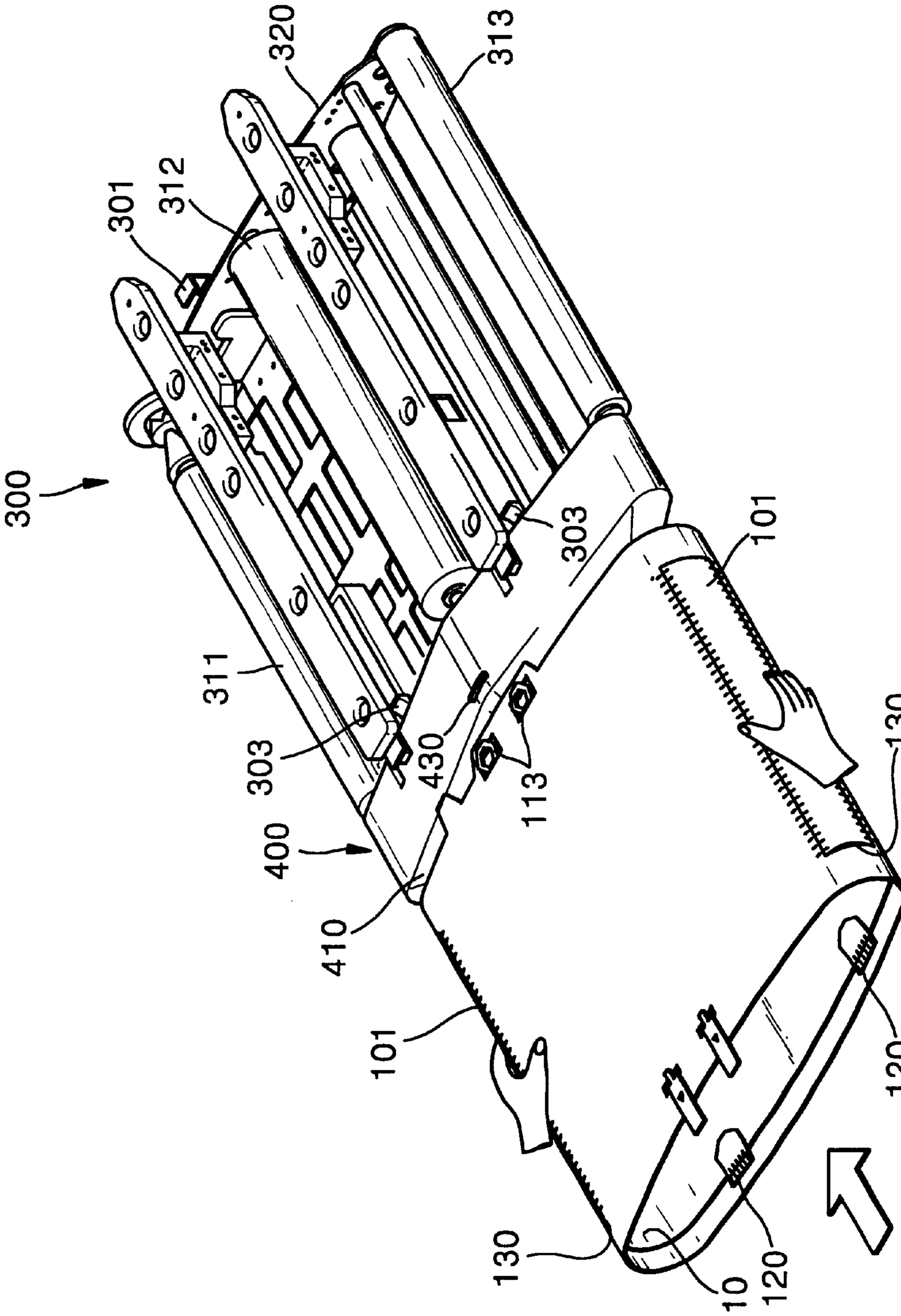

320
313
301
312
300
311
303
430
113
303
101
400
410
101
130
120
10
120
130

FIG. 12

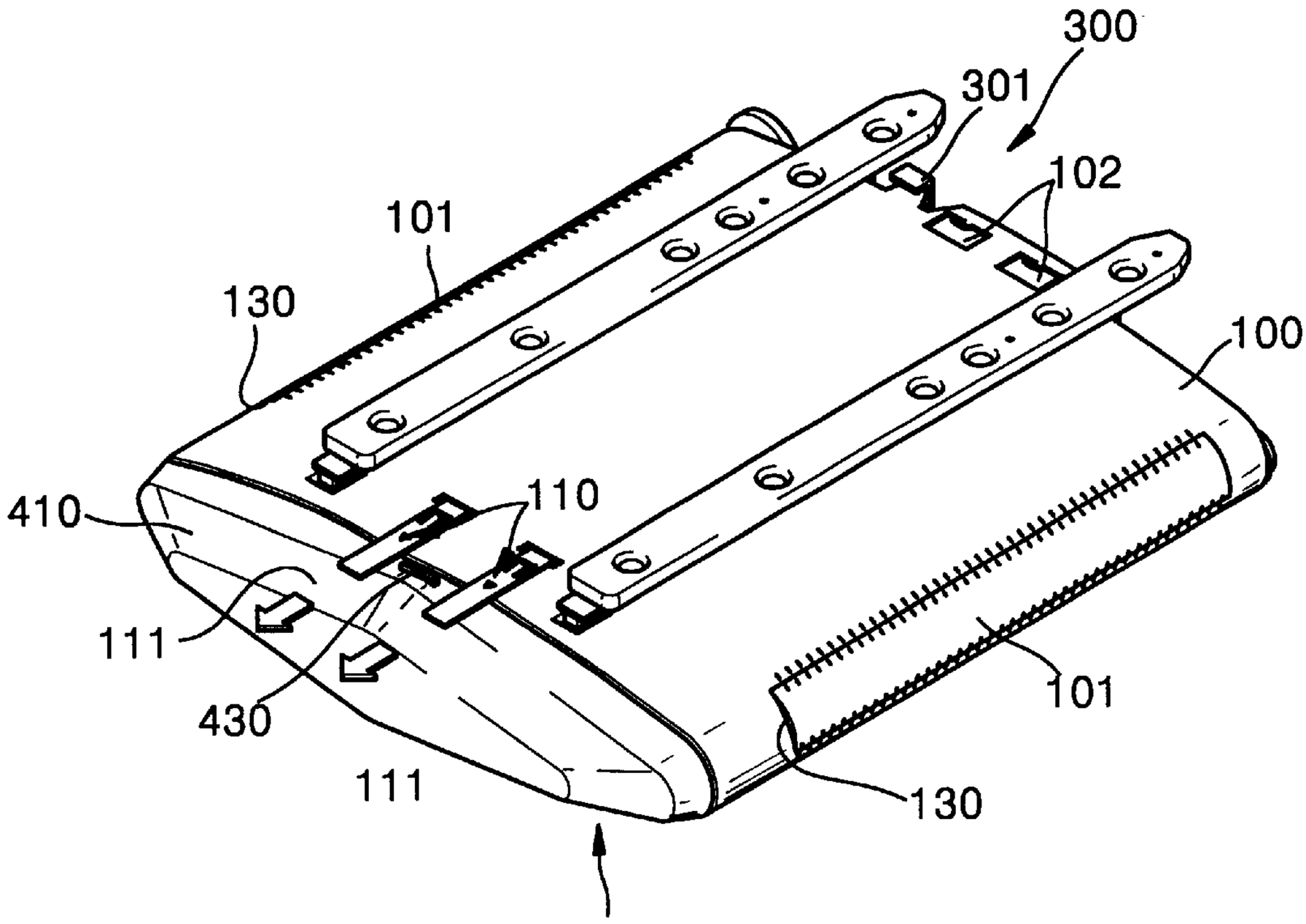
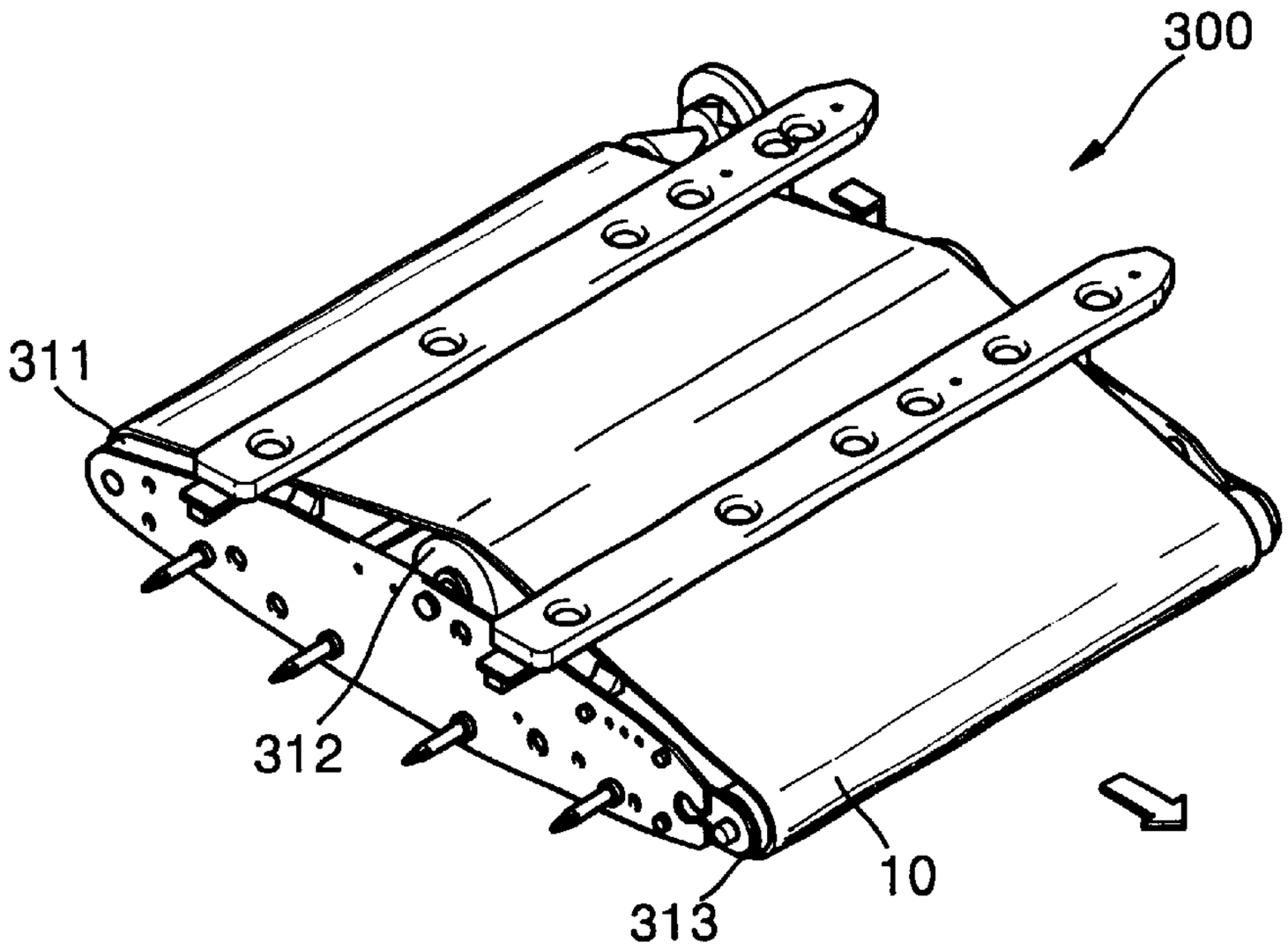

300
301
102
101
130
100
410
110
111
430
111
101
130
400

FIG. 13


300
311
312
313
10

PHOTOSENSITIVE BELT CARTRIDGE OF ELECTROPHOTOGRAPHIC IMAGE FORMING APPARATUS AND PHOTOSENSITIVE BELT INSTALLATION DEVICE AND METHOD EMPLOYING SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a photosensitive belt cartridge for keeping a photosensitive belt to be installed in an electrophotographic image forming apparatus, and a photosensitive belt installation device and method employing the same. Korean Patent Application No. 00-39092, filed Jul. 8, 2000, is incorporated herein in its entirety by reference.

2. Description of the Related Art

As shown in FIG. **1**, an electrophotographic image forming apparatus such as a color laser printer includes a photosensitive belt **10** circulating around a continuous loop while supported by a plurality of rollers **11**, **12**, and **13** installed in a main body of the image forming apparatus. On one surface of the photosensitive belt **10**, an image to be printed is developed by a developing unit **15**, and the developed image is dried while passing by a drying unit **16**, and then is printed on a paper sheet at a transfer unit **14** including a transfer roller **14***a* and a fuser roller **14***b*. Here, the unit around which the photosensitive belt **10** circulates is called a belt unit.

However, as such a photosensitive belt **10** is used for a long time, a developed image gradually deteriorates in its precision. Therefore, when the photosensitive belt **10** reaches the end of its usable life, the photosensitive belt **10** must be replaced with a new one to continue to develop a neat image. However, in order to replace the photosensitive belt **10** in a conventional method, the photosensitive belt **10** is replaced by fitting it directly by hand in its installation position within the main body of the apparatus. In this method, one **13** of the plurality of rollers **11**, **12**, and **13** is installed to be movable as shown in dotted lines in FIG. **1**, and when replaced, the photosensitive belt **10** is loosened by moving the roller **13** to the position shown in dotted lines, and then is removed from its installation position by hand. Subsequently, after a new photosensitive belt is inserted into its installation position by hand, the new photosensitive belt is tensioned by moving the roller **13** to its original position.

However, since the shape of the endless photosensitive belt **10** is not a rigid patterned shape, and the endless photosensitive belt **10** is as flexible as paper, there are problems in that to replace the photosensitive belt **10** by fitting it in place by hand is bothersome and difficult in itself, and, in addition, the photosensitive belt **10** may be erroneously installed depending upon a worker who performs the replacing job.

Therefore, to solve those problems, a cartridge **20** for receiving such a photosensitive belt **10** as shown in FIG. **2** has been proposed. The main body of the photosensitive belt cartridge **20** is comprised of a hard case having a shape similar to the endless track of the belt unit, and leaf springs **21** installed at the inner circumferential surface of the cartridge **20** and supporting the photosensitive belt **10** in a continuous loop state (i.e., in a state as the photosensitive belt **10** is installed around the belt unit). Reference symbol S denotes spare space provided so that the roller **13** can be moved to tension the photosensitive belt **10** when the photosensitive belt **10** is installed around the belt unit. Therefore, when the photosensitive belt **10** is installed, the

cartridge **20** receiving the photosensitive belt **10** is pushed on, in the direction of arrow "A," around the belt unit within the image forming apparatus. When the roller **13** is moved as much as the spare space (S) as shown in FIG. **3**, the photosensitive belt **10**, supported by the leaf springs **21**, is tightly tensioned. At this time, when the cartridge **20** is pulled back toward the outside, only the photosensitive belt **10** remains around the belt unit.

When the above hard-case cartridge **20** is used, the photosensitive belt **10** can be conveniently installed as described above. However, it is a problem to store the cartridge **20**. That is, since the cartridge **20** has nearly the same shape as that of the belt unit around which the photosensitive belt **10** circulates in an endless belt state, the volume of the cartridge is larger than the belt unit, and there is no way to reduce the volume any more due to the hard case of the cartridge **20**. Therefore, although the photosensitive belt **10** can be safely stored, and be easily installed, it is troublesome to store the cartridge **20**.

SUMMARY OF THE INVENTION

To solve the above problem, it is an objective of the present invention to provide a photosensitive belt cartridge adapted to occupy small space during storage, and to be used in replacing a photosensitive belt in a convenient and fast manner, and a photosensitive belt installation device and method employing the same.

Accordingly, to achieve the above objective, there is provided a photosensitive belt cartridge of an electrophotographic image forming apparatus including: a soft cartridge which has the endless track shape of a belt unit of the image forming apparatus, which receives a photosensitive belt therein in the endless track shape, which can be rolled up with the photosensitive belt received therein, and which has flexibility so that the rolled-up soft cartridge can be restored back to its original shape when an external force is removed; and a hard cartridge in which the soft cartridge is stored in a rolled-up state.

In addition, there is provided a photosensitive belt installation device of an electrophotographic image forming apparatus for assisting in the installation of a photosensitive belt around a belt unit within the image forming apparatus comprising: an installation guide member which is attached to a front frame of the belt unit when the photosensitive belt is installed, and which has a sloping surface gradually enlarging in a direction from the outside of the image forming apparatus to the belt unit; and a soft cartridge in which the photosensitive belt to be installed around the belt unit is supported by predetermined restricting means in the endless track shape. The soft cartridge is a flexible cartridge having a shape of the endless track of the belt unit, and is open on both sides. The soft cartridge is shaped so that one open side of the soft cartridge fits over the sloping surface of the installation guide member. The soft cartridge is completely pushed around the belt unit along the sloping surface, and, then, the soft cartridge is pulled out and the photosensitive belt is freed from the restricted state by the restricting means, with the photosensitive belt formerly received in the soft cartridge remaining around the belt unit.

In addition, there is provided a photosensitive belt installation method of an electrophotographic image forming apparatus for installing a photosensitive belt around a belt unit within the image forming apparatus including the steps of: preparing a soft cartridge which is a flexible cartridge having a shape of the endless track of the belt unit, which is open on both sides, and in which the photosensitive belt to

be installed around the belt unit is supported by predetermined restricting means in the endless track shape; installing an installation guide member which has a sloping surface gradually enlarging in a direction from the outside of the image forming apparatus to the belt unit at the front frame of the belt unit; fitting one open side of the soft cartridge to the sloping surface of the installation guide member, and completely pushing the soft cartridge around the belt unit along the sloping surface; and causing the photosensitive belt received in the soft cartridge to remain around the belt unit by pulling out the soft cartridge from the image forming apparatus after the photosensitive belt is freed from the restricted state by the restricting means.

BRIEF DESCRIPTION OF THE DRAWINGS

The above objective and advantage of the present invention will become more apparent by describing in detail preferred embodiments thereof with reference to the attached drawings in which:

FIG. **1** is a schematic diagram illustrating essential portions of a general electrophotographic image forming apparatus;

FIGS. **2** and **3** perspective and front views illustrating a conventional cartridge for storing and installing a photosensitive belt;

FIG. **4** is a perspective view illustrating a photosensitive belt cartridge according to the present invention;

FIG. **5** is a perspective view illustrating a soft cartridge of the photosensitive belt cartridge shown in FIG. **4** in an expanded state;

FIR. **6** is a plan view illustrating a band member of the photosensitive belt cartridge shown in FIG. **4**;

FIG. **7** is a perspective view illustrating an engagement-hole portion of the photosensitive belt cartridge shown in FIG. **4**, into which an engagement portion of the band member shown in FIG. **6** is inserted;

FIG. **8** is a perspective view illustrating a belt unit around which a photosensitive belt is installed;

FIG. **9** is a perspective view illustrating the belt unit of FIG. **8** to which an installation guide member is installed;

FIG. **10** is a perspective view illustrating the installation guide member shown in FIG. **9**;

FIG. **11** is a perspective view illustrating the operation of fitting the soft cartridge of FIG. **5** to the belt unit of FIG. **8**;

FIG. **12** is a perspective view illustrating the belt unit to which the soft cartridge has been fitted; and

FIG. **13** is a perspective view illustrating the belt unit around which the photosensitive belt has been installed after the soft cartridge with the soft cartridge removed.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. **4** and **5** show the structure of a photosensitive belt cartridge of an electrophotographic image forming apparatus according to the present invention. As shown in FIGS. **4** and **5**, a photosensitive belt cartridge according to the present invention includes a cylindrical hard cartridge **200**, and a soft cartridge **100** receiving a photosensitive belt **10** and stored in the hard cartridge **200** in a rolled-up state.

The soft cartridge **100** is made of a flexible material such as polyethylene film or PVC film, and is not plastically deformed even though it is rolled up as shown in FIG. **4**. Therefore, when an external force is removed, the soft cartridge **100** is restored back to its original shape, and expands as shown in FIG. **5**. The expanded shape thereof is the endless track shape of a belt unit with its sides open. The photosensitive belt **10** is also received in the soft cartridge **100** in the same endless track shape as when the photosensitive belt **10** is installed around the belt unit within the image forming apparatus. To this end, a plurality of band members **110** and hooking pieces **120** are provided as restricting means and auxiliary restricting means. Since the band members **110** and the hooking pieces **120** can be rolled up when the soft cartridge **100** is rolled up, it is preferable that they are made of the same material as that of the soft cartridge **100**.

The band member **110** is split into three branches at one end, and is integrally connected at the other end, as shown in FIGS. **5** and **6**. In addition, a hexagonal engagement portion **113** is formed at the top end of the other end. The end portions of both outer branches **112** of the three branches are fixed to the upper inner wall surface of the soft cartridge **100**. The center branch **111** is passed through a slit **104** of the soft cartridge **100** and extends along the outer wall of the soft cartridge **100**. Reference numeral **111** a denotes a cut portion formed so that the cut portion **111** a can hook on the slit **104**, and the center branch **111** can be prevented from escaping from the slit **104**. Both the outer branches **112** are called fixed branches and the center branch **111** is called a movable branch. In addition, the engagement portion **113** at the other end of the band member **110** is elastically inserted into an engagement hole **102** formed at the side edge portion of the soft cartridge **100** positioned across the soft cartridge **100** from the slit **104** so that the band member **110** can extend across the upper inner wall of the soft cartridge **100**. That is, since the distance between two opposing angular points of the hexagonal engagement portion **113** is set to be longer than the width of the engagement hole **102**, the engagement portion **113** is elastically bent while inserted into the engagement hole **102**, and is expanded back to fix itself in place after passing through the engagement hole **102**.

On the other hand, when the band member **110** is strongly pulled out, the engagement portion **113** is caused to escape from the engagement hole **102**. Reference numeral **103** denotes a stopper piece for preventing the engagement portion **113** from easily escaping from the engagement hole **102** due to even a small shock after the engagement portion **113** is inserted into the engagement hole **102**, and the free end of the stopper piece **103** is bent upward, as shown in FIG. **7**. A reason why the free end of the stopper piece **103** is bent upward is to prevent the stopper piece **103** from hooking the photosensitive belt **10** within the soft cartridge **100** when the soft cartridge **100** is pulled out from the belt unit **300**.

The photosensitive belt **10** is disposed between the band member **110** and the inner wall of the soft cartridge **100** configured as described above. That is, two upper portions of the photosensitive belt **10** are supported by the two band members **110** extending across the inner wall of the soft cartridge **100** so as not to be loosened in a downward direction (i.e., away from inner wall).

The hooking pieces **120** are installed at the lower inner wall of the soft cartridge **100**. One end of each hooking piece **120** is fixed to the inner wall of the soft cartridge **100**, and the other end is a non-fixed end, i.e., a free end, and is bent to contact the inner wall of the soft cartridge **100**. Two edge portions of the lower portion of the photosensitive belt **10** are inserted, via the free ends of the hooking pieces **120**, and are supported between the hooking pieces **120** and the inner wall of the soft cartridge **100**.

Consequently, the photosensitive belt **10** is supported by the band members **110** which are restricting means, and the

hooking pieces **120** which are auxiliary restricting means, in the endless track shape within the soft cartridge **100**.

In addition, reference numeral **130** denotes a high strength member made of a relatively high strength material such as stainless steel. Each high strength member **130** is inserted into a bag **101**, preferably provided at opposite side surfaces along a width of the soft cartridge **100**. Each high strength member is shaped to have the same curvature as that of the side surfaces of the soft cartridge **100**. These high strength members **130** assist the soft cartridge **100** in maintaining the endless track shape by causing the curvature of both the side surfaces of the soft cartridge **100** to be maintained. Preferably, the high strength members **130** are installed so that a user can carry the soft cartridge **100** while holding portions of the high strength members **130**, and so that the user can hold the portions of the high strength members **130** while inserting the soft cartridge **100** around the belt unit **300** to install the photosensitive belt **10**.

In addition, reference numeral **105** denotes a projection to be detected by a sensor **301** (FIG. **8**). The projection **105** is provided so that the sensor **301** provided at the belt unit can sense the projection **105** and inform the user of the completion of the insertion of the soft cartridge **100**, when the soft cartridge **100** is inserted into the image forming apparatus.

As shown in FIG. **4**, such a soft cartridge **100** is rolled up and stored in the hard cartridge **200** until the soft cartridge **100** is used while containing the received photosensitive belt **10** therein. As a result, since the soft cartridge **100** is stored in the cylindrical hard cartridge **200** in a rolled-up state, the space occupied by the hard cartridge **200** can be much smaller than that required when the photosensitive belt **10** is conventionally stored on a cartridge in the fully expanded volume of the endless track shape.

When the photosensitive belt **10** is required to be installed, the soft cartridge **100** receiving the photosensitive belt **10** is pulled out from the hard cartridge **200** after removing a cap **210** of the hard cartridge **200**. Then, the soft cartridge **100** expands back as shown in FIG. **5**.

As shown in FIG. **8**, a plurality of rollers including three main supporting rollers **311**, **312** and **313** are installed between a front frame **310** and a rear frame **320** in a belt unit **300** around which the photosensitive belt **10** is to be installed. The photosensitive belt **10** circulates around the endless track while supported by the rollers. Reference numeral **314** denotes the shafts of the rollers besides the main rollers **311**, **312**, and **313**, which support the lower portion of the photosensitive belt **10**, and the shafts **314** extend and project in front of the front frame **310**.

In order to install the photosensitive belt **10**, first, an installation guide member **400** is installed at the front frame **310** of the belt unit **300**, as shown in FIG. **9**. The installation guide member **400** has a connection hook **420** which is elastically fitted to a connection hole **302** (FIG. **8**) of the front frame **310**, as shown in FIGS. **9** and **10**, and has a sloping surface **410** which gradually enlarges in a direction from the outside of the image forming apparatus to the belt unit **300**. The sloping surface **410** is formed in consideration of possible drooping of the soft cartridge **100** on the open side since the soft cartridge **100** is flexible as described above. Therefore, although the soft cartridge **100** droops on the open side, the soft cartridge **100** is easily fitted to the belt unit **300** along the sloping surface **410**, and is gradually spread by the sloping surface **410** to restore its original endless track shape while pushed on around the belt unit **300**. Reference numeral **440** denotes holes for receiving the shafts **314** of the above rollers, and reference numeral **430** denotes a marking projection for guiding the position of completion of the pushing operation of the soft cartridge **100** around the belt unit **300**.

After the installation guide member **400** as described above is installed at the front frame **310** of the belt unit **300**, the soft cartridge **100** taken out from the hard cartridge **200** is pushed on around the belt unit **300** as shown in FIG. **11**. At this time, when the user holds both sides of the soft cartridge **100** at which the high strength members **130** are installed, and pushes the soft cartridge **100** on around the belt unit **300**, the open side of the soft cartridge **100** is gradually spread along the sloping surface **410** of the installation guide member **400**, and is fitted to the belt unit **300**. The soft cartridge **100** is pushed on until the rear edge of the soft cartridge **100** is aligned with the marking projection **430** formed on the installation guide member **400**. At this moment, the projection **105** (FIG. **5**) is sensed by the sensor **301**, and the sensor **301** generates a signal for informing the user of the completion of the pushing operation of the soft cartridge **100**.

When the pushing operation of the soft cartridge **100** is completed as shown in FIG. **12**, the user holds the movable branches **111** of the two band members **110** and pulls the movable branches **111** in the direction of arrows. Then, the engagement portions **113** of the band members **110** are pulled out from the respective engagement holes **102**, and accordingly, the photosensitive belt **10** hung over and supported by the band members **110** is seated around the rollers including the main supporting rollers **311**, **312**, and **313** of the belt unit **300**. The triangle symbols marked on the movable branches **111** are intended for guiding the position of pulling the band members **110**. When the band members **110** are pulled until the symbols reach the edge of the soft cartridge **100**, the engagement portions **113** are completely pulled out from the engagement holes **102**.

In this state, when the soft cartridge **100** is again pulled out from the belt unit **300**, the photosensitive belt **10** remains around the belt unit **300** and only the soft cartridge **100** is pulled away from the belt unit **300**. Since the belt unit **300** is provided with belt stoppers **303**, the belt stoppers **303** interfere with the photosensitive belt **10** so that the photosensitive belt **10** can not be pulled out together with the soft cartridge **100** when the soft cartridge **100** is pulled out from the belt unit **300**.

As described above, after the soft cartridge **100** is pulled out, the installation guide member **400** is removed, and the installation of the photosensitive belt **10** is completed when the roller **313** is moved in the direction of the arrow shown in FIG. **13**, making the photosensitive belt **10** tightly tensioned.

In addition, it is preferable that the thickness of the material of the soft cartridge **100** is set to be about 0.15~0.25 mm. When the thickness is too thin, the endless track shape cannot be maintained and the soft cartridge **100** easily droops, and when the thickness is too thick, it is difficult to roll up the soft cartridge **100**. Therefore, to make the thickness be about 0.15~0.25 mm is advantageous for storing the soft cartridge **100** and performing the installation operation of the photosensitive belt **10**.

In addition, if light passes through the soft cartridge **100**, the photosensitive belt therein may be damaged. Therefore, it is preferable that the color of the soft cartridge **100** is an opaque color such as a black color.

As described above, when the operation of replacing a photosensitive belt is performed by employing the photosensitive belt cartridge of an electrophotographic image

forming apparatus and the photosensitive belt installation device according to the present invention, since the soft cartridge can be stored in the hard cartridge in a rolled-up state before the installation, and can be expanded when installed, the space required for storing the photosensitive belt can be considerably reduced. In addition, since the soft cartridge is simply pushed on around the belt unit and is simply pulled out from the belt unit by using the installation guide member when the photosensitive belt is installed, the replacing operation of the photosensitive belt can be performed in a very convenient and fast manner.

It is contemplated that numerous modifications may be made to the present invention without departing from the spirit and scope of the invention as defined in the following claims. For example, the engagement portion may have shapes other than hexagonal (e.g., polygonal, circular, and/or having different interior and exterior shapes).

What is claimed is:

1. A photosensitive belt cartridge of an electrophotographic image forming apparatus comprising:

a soft cartridge which has an endless track shape of a belt unit of the image forming apparatus, which receives a photosensitive belt therein in the endless track shape, which is flexible and is rolled up for storage, and which restores back to the endless track shape when an external force applied for storage is removed.

2. The photosensitive belt cartridge of an electrophotographic image forming apparatus as claimed in claim **1**, wherein the soft cartridge rolls up for storage with the photosensitive belt received therein.

3. The photosensitive belt cartridge of an electrophotographic image forming apparatus as claimed in claim **1**, further comprising a hard cartridge in which said soft cartridge is stored in the rolled-up state.

4. The photosensitive belt cartridge of an electrophotographic image forming apparatus as claimed in claim **1**, wherein the soft cartridge is made of a material selected from the group consisting of polyethylene film and PVC film.

5. The photosensitive belt cartridge of an electrophotographic image forming apparatus as claimed in claim **4**, wherein the thickness of the material of the soft cartridge is 0.15~0.25 mm.

6. The photosensitive belt cartridge of an electrophotographic image forming apparatus as claimed in claim **1**, wherein the soft cartridge further comprises a restricting means for restricting the photosensitive belt received therein in a direction to cause the photosensitive belt to closely contact an inner wall of the soft cartridge, and for freeing the photosensitive belt from the restricted state when the photosensitive belt is installed around a belt unit within the image forming apparatus.

7. The photosensitive belt cartridge of an electrophotographic image forming apparatus as claimed in claim **6**, wherein the restricting means includes a band member which is disposed in a width direction of the soft cartridge,

wherein a first end portion of the band member is fixed to a first edge of the soft cartridge,

wherein a second end portion of the band member is removably joined to an engagement hole provided at a second edge of the soft cartridge, which is an edge of the soft cartridge across from the first edge, and

wherein the photosensitive belt, when received by said soft cartridge, is hung over and supported by the band member.

8. The photosensitive belt cartridge of an electrophotographic image forming apparatus as claimed in claim **7**, wherein said first end portion of the band member comprises:

at least one fixed branch fixed to the first edge at the inner wall of the soft cartridge; and

a movable branch which passes through a slit formed at the first edge of the soft cartridge, from an inner side of the soft cartridge to an outer side of the soft cartridge, and which extends along an outer wall of the soft cartridge after passing through the slit,

wherein said second end portion of the band member releases from the engagement hole when the movable branch is pulled out.

9. The photosensitive belt cartridge of an electrophotographic image forming apparatus as claimed in claim **7**, wherein the band member is made of a material selected from the group consisting of polyethylene film and PVC film.

10. The photosensitive belt cartridge of an electrophotographic image forming apparatus as claimed in claim **6**, wherein the soft cartridge rolls up for storage with the photosensitive belt received therein; and

wherein the soft cartridge further comprises auxiliary restricting means for restraining the photosensitive belt from being separated from the soft cartridge, while the photosensitive belt is stored, by pressing an edge portion of the photosensitive belt against the inner wall of the soft cartridge,

wherein said restricting means are installed at an upper portion of the soft cartridge, and

wherein said auxiliary restricting means are installed at the lower portion of the soft cartridge.

11. The photosensitive belt cartridge of an electrophotographic image forming apparatus as claimed in claim **10**, wherein the auxiliary restricting means includes a hooking piece having a fixed end and a free end, said fixed end being fixed to the inner wall of the lower portion of soft cartridge so that the edge portion of the photosensitive belt is inserted and supported between said free end of the hooking piece and the inner wall of the soft cartridge.

12. The photosensitive belt cartridge of an electrophotographic image forming apparatus as claimed in claim **1**, wherein high strength members having a shape compatible with a curvature of corresponding portions of the endless track shape of the belt unit are installed at opposite side surfaces of the soft cartridge along a width direction.

13. The photosensitive belt cartridge of an electrophotographic image forming apparatus as claimed in claim **1**, wherein the color of the soft cartridge is an opaque color which does not pass light.

14. A photosensitive belt installation device of an electrophotographic image forming apparatus for assisting the installation of a photosensitive belt around a belt unit within the image forming apparatus comprising:

an installation guide member which is attached to a front frame of the belt unit when the photosensitive belt is installed, and has a sloping surface gradually enlarging in a direction from an outside of the image forming apparatus to the belt unit; and

a soft cartridge which is a flexible cartridge having a shape of an endless track of the belt unit, which is open on both sides, in which the photosensitive belt to be installed around the belt unit is supported by predetermined restricting means in the endless track shape, and which is shaped so that one open side of the soft cartridge is fits over the sloping surface of the installation guide member,

wherein the sloping surface guides the soft cartridge onto the belt unit during installation of the photosensitive belt around the belt unit,

wherein, when the soft cartridge is completely pushed around the belt unit and is then pulled out from the belt unit, the predetermined restricting means frees the photosensitive belt received in the soft cartridge, wherein the photosensitive belt remains around the belt unit.

15. The photosensitive belt installation device of an electrophotographic image forming apparatus as claimed in claim **14**, wherein the installation guide member further comprises a marking projection indicating an edge position of the soft cartridge,

wherein the marking projection is for indicating the edge position of the soft cartridge when the soft cartridge is completely pushed around the belt unit.

16. The photosensitive belt installation device of an electrophotographic image forming apparatus as claimed in claim **14**, wherein the belt unit is provided with at least one belt stopper which causes the photosensitive belt not to be pulled out together with the soft cartridge by interfering with an outer edge of the photosensitive belt when the soft cartridge is pulled out from the image forming apparatus.

17. A photosensitive belt installation method of an electrophotographic image forming apparatus for installing a photosensitive belt around a belt unit within the image forming apparatus including the steps of:

preparing a soft cartridge which is a flexible cartridge having a shape of an endless track of the belt unit and open on both sides, and in which the photosensitive belt to be installed around the belt unit is supported by predetermined restricting means in the endless track shape;

installing an installation guide member, which has a sloping surface gradually enlarging in a direction from an outside of the image forming apparatus to the belt unit, at the front frame of the belt unit;

fitting one open side of the soft cartridge to the sloping surface of the installation guide member, and completely pushing the soft cartridge around the belt unit along the sloping surface; and

causing the photosensitive belt received in the soft cartridge to remain around the belt unit by pulling out the soft cartridge from the image forming apparatus after the photosensitive belt is freed from a restricted state by the restricting means.

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